



PHENIX RICH OPERATIONS IN THE PEH

procedure name

PHENIX Procedure No. PP-2.5.2.7-06

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Approvals

PHENIX S E & I Date

Cognizant Scientist/Engineer Date
/Activity Manager

PHENIX Safety Date

CA-D ES&H/SAFETY Date

Operating Procedure of RICH for the 2004 Run

1.0 Purpose

The purpose of this document is to define the plan for operation of the PHENIX RICH subsystem in the PEH (PHENIX Experimental Hall) during the 2004 run. This plan will ensure:

- 1.1 the safety of all personnel from risks associated with the operation of the RICH detector, including the operation of the gas system for Cerenkov radiator gas and the operation of the high voltage systems to power RICH photomultiplier tubes,
- 1.2 the implementation of the appropriate emergency approaches,
- 1.3 prompt notification of the appropriate C-AD and S&EP specialists,
- 1.4 the maintenance of appropriate C-AD emergency status,
- 1.5 the preservation and protection of the environment, and
- 1.6 the preservation of BNL facilities and equipment.

The operating procedure of the RICH CO₂ gas system is described in PHENIX Procedure No. PP-2.5.3.14-07.

2.0 Responsibilities

During the 2004 run, there will be two levels of responsibility for the oversight of the RICH subsystem.

The first level of responsibility will be the PHENIX Shift Crew. Prior to data taking, there will be a period of RICH commissioning when RICH is tested at high voltage before the IR is closed and the RICH is inaccessible. During the commissioning phase, the RICH gas system and HV&LV systems will be monitored primarily by the team of RICH Experts. A record of the performance of the RICH system will be kept by the experts.

During data taking, it will be the responsibility of the PHENIX Shift Crew to:

- 2.1 monitor the status and alarms for the RICH gas system and HV&LV system according to a prescribed check off list at least once a shift (eight hours)
- 2.2 In the event of an alarm or irregularity, contact an expert from the Expert Call List given in Appendix A.

The second level of responsibility is the RICH Experts. It is the responsibility of the RICH Experts to:

- 2.3 maintain the RICH subsystem in a safe operating condition. This includes:

- 2.3.1 setting, adjusting, and checking the HV&LV power supplies,
- 2.3.2 setting, adjusting, and checking the radiator gas (CO₂) flow rate,
- 2.3.3 monitoring temperature inside the RICH vessel
- 2.3.4 position any special instructions or notifications as required, and carrying out any emergency action, as prescribed in the Procedures section of this document.

3.0 Prerequisites

The RICH Experts shall have read or have training in the following areas:

- 3.1 GET (HP-V-001)
- 3.2 C-A Dept. User Access training
- 3.3 C-AD Project Local Emergency Plan (C-A-OPM 3.0),
- 3.4 RHIC Access & PHENIX IR Access Training,
- 3.5 BNL Electrical Safety I (TQ-ELECSAF1)
- 3.6 BNL Haz-Com (HP-IND-200 and 200R/220R)
- 3.7 BNL Stop Work (GE-STOPWORK)
- 3.8 BNL Emergency Response (GE-EMERGPLAN)
- 3.9 BNL Environmental Protection Course (GE-ENV-GET)
- 3.10 PHENIX specific Fall protection document
- 3.11 PHENIX Access Awareness document
- 3.12 Emergency Procedures for the PHENIX experiment
- 3.13 PHENIX RICH subsystem specific training,
- 3.14 Geographical layout of the experimental area (routes of egress, location of emergency equipment, phones and controls)

Additional training is required for the operation of the RICH gas system as it is described in "Operation of the RICH Gas system" (PHENIX Procedure No. 2.5.3.14-07)

The RICH Experts shall train all personnel involved in the RICH running in the safe operation of the RICH HV&LV and the RICH gas systems.

4.0 Precautions

The safety of personnel is of primary importance. The RICH Experts and Shift Crew members shall take great care to ensure that the RICH subsystem will be operated in a way that does not place personnel at risk of physical harm.

- 4.1 HV system precautions

The RICH HV system is used to power the photo-multipliers that are housed in gas vessels filled with CO₂ gas during the operation. The HV power supplies are housed in electrical racks whose doors are closed when HV is turned on.

4.2 LV system precautions

RICH utilizes high current low voltage (+5, +8, -8V) power supplies to provide power required by FEM crates to operate. This power is delivered from the LV power supply bin to the FEM crates in the same electric rack via fuse-protected terminal blocks. Because the voltage is low, LV wires may stay energized while doors are open to allow test-work on FEM crates. Low voltage power (+6.5 V) is supplied to RICH pre-amplifiers from low current low voltage supply modules (4 A max, +6.5 V) in the LV power supply bin.

5.0 Standard Operating Procedures

5.1 HV system Procedures: Turning on the high voltage:

In normal operations the experimental hall will be closed to personnel making access to any HV point impossible. Under such conditions, follow this procedure for turning on the HV:

- 5.1.1 Before turning on the HV, check that the RICH gas vessel is filled with CO₂ as per PHENIX procedure No. PP-2.5.3.14-07. Check that cooling water of the RICH PMTs is turned on. The RICH HV rack should be closed
- 5.1.2 Check that the appropriate current limits are in place for the power supply
- 5.1.3 Check that the target voltage for each HV output line is appropriate.
- 5.1.4 Check that the ramp up rate for each HV supply is appropriate.
- 5.1.5 Turn on and slowly ramp up the HV channels.
- 5.1.6 If any of the HV supplies trips, disable that channel until the reason for the trip is understood.
- 5.1.7 If there are no HV trips, verify that the operating currents are appropriate.
- 5.1.8 When ramping is complete, verify that the operating currents are appropriate, as given in the operating log for each channel.
- 5.1.9 Check that all of temperature sensors attached to photomultiplier tubes are well below 40 degree C during the first 2-3 hours
- 5.1.10 HV is ready for RICH testing.

5.2 HV system Procedures: Turning off high voltage to RICH photomultiplier tubes

- 5.2.1 Begin ramping down the HV.
- 5.2.2 Verify by the read back that the HV is off the system.

5.3 LV system procedures: Turning on LV power supply to RICH FEE crate

- 5.3.1 Check that cooling water for the RICH FEE rack is on.
- 5.3.2 Turn on RICH FEE power supply.
- 5.3.3 Check that the temperatures at the FEE crate are well below 40 degrees C.
- 5.3.4 If the over heating of the FEE crates are detected, call RICH expert.

5.4 LV system procedures: Turning off LV power supply to RICH FEE crates

- 5.4.1 Turn off the LV power supplies to the RICH FEE crates.

5.5 Rich Gas system procedures

These are described in PHENIX procedures No. 2.5.3.14-07

6.0 HV lock out procedure during maintenance

6.1 In the case where maintenance work is necessary during a long term shutdown, follow this procedure before you start any work to avoid working while the HV is on:

- 6.1.1 Plug out a BNC cable which is connected to the HV interlock line placed at the back plane of the HV crate which guarantees that neither a switch in the front panel nor software switches can turn on the HV.
- 6.1.2 Start the maintenance work.
- 6.1.3 Plug in the BNC cable to the original place after the maintenance is completed

7.0 Documentation

Read Thoroughly documents placed in

http://www.phenix.bnl.gov/WWW/run/04/subsys_tutorials/rich/

8.0 References

- 8.1 C-A-OPM 3.16, "Emergency Plan for the Phenix detector building 1008 complex"
- 8.2 BNL SBMS.

Appendix

Call list for the RICH subsystem experts

Kyoichiro Ozawa	x4015
Takao Sakaguchi	x3345
Fukutaro Kajihara	x2734
Anthony D. Frawley	